DO PUBLIC SECTOR BANKS PROMOTE REGIONAL GROWTH?

EVIDENCE FROM AN EMERGING ECONOMY

ABSTRACT

A large literature exists on the relationship between financial development and economic growth. The role of government and public banks in building this relationship has however, remained contentious. In this study in a sub-national level of analysis in the context of large emerging economy, India we raise the question what is the relative impact of public banks in economic growth in the lagging regions vis-à-vis leading regions? Do they matter more than the private and foreign banks? To address these problems, we apply dynamic GMM panel estimator on an unbalanced panel dataset drawn from 25 Indian states covering period 1996/97 to 2008/09. Although our study is in the Indian context, it is relevant for developing countries for mainly two reasons: government ownership of banks has been widely prevalent in developing countries and in many large countries in a federation set-up inter-state differences may exist with multiple ownership of the financial sector.

Keywords:

Public sector banks, economic growth, credit, lagging regions, India

JEL Classification: O16; O23; O53; G21

1. INTRODUCTION

A large literature exists on the relationship between financial development and economic growth. The role of government and public banks in building this relationship has however, remained contentious. Some studies suggest that public banks due to their nature of ownership can overcome problems of regional segmentation in the credit markets; weak institutions; inadequate regulatory framework; high transactions costs, asymmetric information and risks in lending capital (Besley 1994: Greenwald, Levinson and Stiglitz 1993; Dow & Rodríguez-Fuentes 1997; Rodríguez-Fuentes 1998; Önder & Özyildirim 2010; Stiglitz 1989). Private and foreign banks in contrast, may be risk averse and reluctant to lend to the economically weak regions due to lack of developed institutions, risk perception of projects and expectations of low returns. Foreign banks may be especially reluctant and risk averse due to cultural barriers and difficulties in recovering loans (Mian 2006). Public banks therefore, play gap filling role and allow lagging regions realize higher growth than would be possible if the financial services are left to market mechanisms. This supportive role of public banks, often referred as development view, primarily emerged in the fifties and sixties due to the specific needs of newly independent developing countries: urgency to catch-up with developed countries; large projects size; lumpy investments, and capital scarcity (Gerschenkron, 1962).

Government ownership can also be useful in building trust in savers, enabling improved outreach through the spread of bank branches, and help develop banking habits of the population. Porter (1966) noted that the development of banking habits would lead to increased savings, investment, improved capital allocation efficiency, and increased monetary authorities' ability to stabilise the economy.

Recent literature suggests that public banks contribute to financial stability, provide lending support during periods of instability and economic recessions, avoid extreme moral hazard problems associated with private banks; encourage constrained behaviour often accompanied with development objectives and promote economic growth (Andrianova et al. 2009; Andrianova 2012; Cole 2009; Bertay, Demergüc-Kunt and Huizinga 2012; Coleman and Feler 2015; Panizza 2012; Yeyati, Micco and Panizza 2007; Micco and Panizza 2006). Credit by the state banks is less procyclical and less responsive to macroeconomic shocks than the credit through private banks. For example, during the 2008 crisis the government banks continued providing funds to the real economy, in contrast to private and foreign banks

(Coleman and Feler 2015). Easy availability of funds and government guarantees may also make public banks less risk averse, which could lead to increase in credit (Ivashina and Scharfstein 2010).

Several studies however, argue that government ownership of banks hurts financial development, leads to inefficiencies and low economic growth (La Porta et al. 2002; Sapienza 2004; Khwaja & Mian 2005). This is also known as political view and argues that government ownership of banks could be politically motivated and leads to misallocation of resources. Dinc (2005) in cross-country analysis of 36 emerging countries showed that government banks lend more during elections than private banks. Sapienza (2004) finds that state owned banks treat politically connected firms differently and charge lower interest rates than private banks.

In this study, we raise the following questions: what is the relative impact of public banks in economic growth in the lagging regions vis-à-vis leading regions? Do they matter more than private and foreign banks? We examine these questions at the sub-national level in the context of a large emerging economy, India and use unbalanced panel data drawn from 25 states covering 1996-2008. In order to see the relative impact of different types of banks, we also aim to establish whether the impact of public banks on growth is generally higher than private and foreign banks, and also relatively higher in less developed than developed regions. For this purpose, we use GMM estimator and employ various tests to test the robustness of our results.

Our study is significant for several reasons. Firstly, the novelty of this work lies in the sub-national level of analysis in a literature predominantly focused on cross-country studies. The sub-national units may differ significantly from the national level economically, socially, geographically and even politically requiring a different set of policy responses tailored to their own specific needs (Kendall 2009). Paying attention to public banks at lower levels also matters as alleviating local financial constraints could spur local economic growth (Coleman and Feler 2015). The sub-national enquiry is especially important as the states play an important role in poverty reduction and achievement of Sustainable Development Goals. The

Indian states are also at different stages of development, experiencing varied levels of economic growth making this analysis even more relevant.[1]

Secondly, India is currently witnessing substantial debate on its growth revival strategies and role of financial sector in this strategy (Rajan 2015). Thirdly, our study relates to post-reform period when most restrictions and controls in the financial sector have been lifted. Further, few studies have examined the contribution of different bank groups more so, in the context of lagging states. Although at the local level, Guiso, Sapienza and Zingales (2004) explored for Italy, Liang (2006) and Chen, Wu and Wen (2013) for China, their studies did not examine contributions of specific bank groups to economic growth. Our study contributes in this respect as well. Finally, although our study is in the Indian context, it is relevant for developing countries in a federation set-up where inter-state differences may exist with multiple ownership of the financial sector. Government ownership of banks has been widely prevalent in the developing countries; a study of this nature is therefore, useful in reflecting on its growth impact.

Our findings suggest that finance matters for growth, and the growth impact of credit offered by public banks is stronger than credit offered by private and foreign banks. It is also marginally stronger in lagging states and is significant when our model is estimated by pooling the data as well as when separate models are estimated for lagging and leading states. However, the differential relative impact of public banks in lagging regions is insensitive to aggregation. As a result, although public banks generated more growth in general, it is not possible to clearly establish whether the growth impact of public banks is higher in lagging regions.

Rest of the paper is structured as follows. Section 2 discusses financial sector reforms in India. The next section presents theoretical considerations. Section 4 introduces empirical model and estimation strategy. Section 5 discusses results and the final section of the study concludes.

2. FINANCIAL SECTOR IN INDIA

[1] It can be alluded that in a large country like India with states at varying levels of development, large inter-state disparities is akin to cross-country analysis with similar pitfalls. Even within a state there could be substantial intra-regional differences.

As in many other developing countries, banks are the major financial intermediary in India and have multiple ownership structures consisting of public, private and foreign banks. Historically, the financial sector before 1960s was fairly free and open. However, it was characterised by volatility as a number of banks were either closed or merged with other banks. The main causes of bank failures were incompetence of directors; unrestricted loans to bank directors or related firms; dishonest management and injudicious investments; insufficient paid-up capital and reserves; absence of central bank and lender of last resort (Tandon, 1990).

Arora (2012) classified banks' role in India's economic development into 3 stages, stage I-1947-1969; stage II-1969-1991; and stage III-1991 onwards. In each of these stages different policies were experimented with the overall objective of increasing economic growth and reduction in poverty. Stage I marked the beginning of the planning era and focus was on achieving industrial growth. Large and heavy industries were therefore, the target of planners. However, by the early sixties policymakers realized that bank credit to agriculture and poor regions was not forthcoming. In stage two therefore, the focus was on agricultural development and balanced regional development. Social control and nationalization of banks in two phases 1969 and 1980 were the hallmarks of this stage. Overall, all banks were in the private sector at the time of the country's independence, however with the nationalization of large banks, most of the banking assets got concentrated in the hands of public banks. An outcome of this was increased credit to borrowers in specific sectors such as agriculture and rural sector and increased banking outreach (Arora 2012; Cole 2009).

In 1991, financial sector reforms took place which marked the third stage of banks' role in India (Arora 2012). Since then the country's financial sector, even though still largely government controlled, has undergone large-scale transformation with increased competition from the private and foreign banks; removal of interest rate controls; improved profitability; adoption of prudential and supervision practices and rationalization of bank branches (Gupta, Kochhar & Panth 2011). Some studies have found evidence of convergence among different types of banks in terms of performance (Bhaumik and Dimova 2004).

Increased competition in the financial sector is reflected in the increased number of foreign and private banks in the recent years. While some private banks existed even prior to reforms, the entry of new ones was largely initiated in 1993 and subsequently 10 new private banks

were set up. In the early 2000s, two large development finance institutions were also converted into banking institutions. As at end 2011, there were altogether 89 commercial banks of which 26 were public, 20 private and 43 were foreign. The share of assets of private banks in total banking sector assets increased from 3.5% in 1991 to 20.2 % in 2012. The public banks hold a majority of banking sector assets at 72.7% (much above the statutory requirement of 51%) and the remainder is held by private and foreign banks.

As public, private and foreign banks' regulator, the Reserve Bank of India has brought down reserve ratios- cash reserve ratios and statutory liquidity ratios significantly in the post-reform period. CRR has been reduced gradually from 15% to 4% and a reduction in SLR is from nearly 40% to 20%. Banks have adopted Basel III guidelines, and the capital reserve adequacy ratio for Indian banks in 2014 was 12.8%. These two measures alone have increased availability of resources to the banking sector. In the reformed environment, banks are also free to decide their deposit interest rates except savings rate. They can also decide lending rates except those on exports, small loans and DRI scheme. Reforms were also carried out in the inter-bank call money market.

Some measures were taken up to improve credit recovery and enforcement of creditors' rights such as Securitisation and Reconstruction of Financial Assets and Enforcement of Securities Interest Act (SARFAESI) in 2002, Credit Information Bureau Act in 2005 and Bankruptcy Act 2016. Several initiatives were taken up on the technological front for instance, setting up of Indian Financial Network, introduction of real time gross settlement system and core banking solutions across the banks (Mohan and Ray 2017). The establishment of Institute for Development and Research in Banking Technology by RBI in 1996 also promoted technological connectivity among the banking sector (Mohan and Ray 2017). As a result of various reforms, gross non-performing assets as proportion of gross advances came down from 15.7% in 1996 to 2.4% in 2009. Capital to risk weighted assets ratio of the banks was 12.7% in 2015. The public banks were also allowed to raise funds from the market. Recent years have however, witnessed rise in the stressed assets of banking system from 9.8% in 2012 to 14.5% in 2015 and for public sector banks from 11.0% to 17.7% during the same period (Mohan and Ray 2017).

Priority lending requirements however, continue to exist and all banks including foreign banks are required to meet targets. Initially targeted at the public banks in 1967-68 and

remodelled in 1980, it was subsequently extended to the private banks. According to current guidelines, domestic banks have a target of 40% of their bank credit for priority lending. Foreign banks with 20 and above branches have also been brought on par with domestic banks from 2012 and have to achieve targets over a period of five years. The prescription for foreign banks with less than 20 branches is 32 % of bank credit (RBI 2015).

Since the reforms, bank branch expansion has been deregulated and banks are no longer tied to the mandatory stipulations of the branch licensing policy of 1977, which required them to open branches in four unbanked locations in order to obtain a license for a new branch in an area with existing bank branches. While branches of foreign and private sector banks are more concentrated in developed areas, public banks are spread out in rural and semi-urban areas as well. As at March 2009, 68.6% of total public bank branches were in rural areas, in contrast to a poor presence of foreign banks at 1.4% and 12.5% of private banks. Foreign banks, on the other hand, were overwhelmingly present in the urban areas (79.5%). Two new sets of banks have also been recently set up - payment banks and small finance banks. Not much is however, known on the performance of these banks due to their recent origin (Mohan and Ray 2017).

Banks in the pre-reform period had the mandate of provision of credit to certain occupations, sectors, regions and population. Post-reforms, these stipulations were relaxed or removed altogether. Banks thus by and large, had freedom of making credit related decisions. Overall, two major changes in the post-reform Indian banking sector were freedom on credit related decisions, introduction of prudential norms, and increased competition in the banking sector (Bhaumik and Piesse 2006; RBI 2006).

3. THEORETICAL CONSIDERATIONS

3.1 Theoretical framework

In regional economic growth theories, finance is often not considered as a variable in regional output. Dow & Rodríguez-Fuentes (1997) in their comprehensive survey on the literature on regional finance point out that “this lack of interest in financial variables within regional economics has often led regional economists to belittle the power of money in explaining regional income differences”. On the disregard of financial variables, for instance in a

comprehensive handbook on regional growth theories published in 2009 (Capello and Nijkamp 2009) finance was not even considered as an input to regional growth. Kim (2008) in a comprehensive survey on theory, facts and policies on spatial inequality and economic development also does not acknowledge finance as a likely cause of regional disparities. To put this in perspective, the existing literature on the role of finance in different regions is generally derived from the mainstream neoclassical theory (Dow & Rodríguez-Fuentes 1997).

The neoclassical theory presumes that as resources are perfectly mobile, they would move into the regions which they deem fit and efficient. The question of some lagging regions attracting sufficient capital for economic growth was, therefore, not a part of the neoclassical agenda as it assumed that the capital was perfectly mobile and flow of finance merely reflects inter-regional differences in terms of resources, employment, output etc. (Dow & Rodríguez-Fuentes 1997). As large number of firms and entrepreneurs seek funds, the selection of best firms guided by returns, would lead to efficient resource allocation (Greenwood & Smith, 1997). The resources, thus, move into those activities or regions which generate the highest returns and may not eventually result in socially desired outcomes as economic self-interest guides the individuals or firms.

In practice, capital is not so mobile and may not flow into the less developed regions. In the absence of any government intervention, resources would flow into regions and sectors where the returns are highest. Low future expectations, increased risks of lending capital; regional segmentation in credit markets; weak institutions; inadequate regulatory framework; high transactions cost, and asymmetric information are some of the factors affecting resource flows into regions and sectors leading to development failure (Dow & Rodríguez-Fuentes 1997; Önder and Özyildirim 2010; Andersen and Tarp 2003).[2] Low absorptive capacity of the regions and poor infrastructure could lead to poor flow of credit to underdeveloped regions (Mehrotra 1992). This possibility of market failure in financial markets due to imperfect or asymmetric information has been raised in the theoretical literature (Grossman and Stiglitz 1976; Stiglitz 1989).[3] Market failures are widespread in rural credit market

[2] Information can be explained as factual knowledge and it can be exchanged among individuals (Lapavitsas, 2003). A market system generates and transmits information and the quality of information disseminated and generated is itself a part of economic development (Johnson, 1969).

[3] Asymmetries in information arise when two individuals enter into a transaction - one individual has lots of factual information while the other does not. If these two individuals enter into a trade, the one with the more

(agriculture, small businesses) due to imperfect information, enforcement, high risks which calls for government intervention in the rural credit markets (Besley 1994).

As mentioned above, since there is market failure the rationale for government intervention is justified, though costs and benefits of its intervention should be considered (Yeyati, Micco and Panizza 2007). The public sector banks are expected to help correct the market failure; assist less developed regions; and provide lending support during periods of financial instability (Gerschenkron, 1962**;** Bertay, Demergüc-Kunt and Huizinga 2012). Low reward structure in public banks avoids extreme moral hazard problem in private sector banks; encourages constrained behaviour often accompanied with development objectives; and lesser financial innovations are some of the factors which could lead public sector banks to contribute to economic growth (Adrianova et al. 2009). Direct ownership of banks can also build trust of people in the banking system, develop their banking habits leading to financial development (Adrianova, Panicos, and Shortland 2002).

Firms (industry), both small and large, also benefit from financial development. Banks as financial intermediaries mobilise resources, collect information, monitor projects and manage risks and allow innovative ventures to take place (King and Levine 1993). Banks also by entering into a long-term relationship with the firms accumulate information benefitting both banks (by reducing their monitoring costs) and firms (Antony and Broer 2010). Rajan and Zingales (1998) found that industries more dependent on external finance grow faster when financial sector is more developed and contribute to economic growth. Firms also have greater access to funds when the legal system is more developed (Demirguc- Kunt and Maksimovic 1998). Overall, local financial development matters for local economic growth as has been documented by several studies (Kendall 2009).

3.2 Theoretical underpinnings of the model

As noted by Odedokun (1996), virtually all the existing empirical studies on the role of finance on economic growth have no framework with standard theoretical underpinnings. Instead, they generally estimate growth as a function of the measure of financial development. For our purpose, to establish the link between the two, we use the augmented

information will gain more, resulting in inefficient outcomes and the market could fail or collapse. It is for this reason that the state intervenes to reduce information asymmetries and improve functioning of market.

Solow growth model, which was suggested by Mankiw, Romer and Weil (1992), as our theoretical framework. Accordingly, we assume that the GDP per capita of a given state can be represented by the following Cobb-Douglas functional form.

$$y_{it} = K_{it}^{\alpha} H_{it}^{\beta} (A_{it} L_{it})^{1-\alpha-\beta} \quad (1)$$

Where y_{it} is the real GDP per capita in state i at time t; K_{it} denotes the share of state government's capital expenditure to total expenditure; H is literacy rate; A represents the level of technology; L represents the size of productive labour force.

Based on our argument in the earlier sections and following Odedokun (1996), we can introduce the financial development as one variable of the model. In addition, considering that the growth of a given state is influenced by the degree of industrialization, we can also introduce the industrial share of the state GDP as one control variable. Finally, following Mankiw and Weil (1992) and Dercon, et al. 2009) and introducing the neoclassical growth convergence, our theoretical model of the per capita GDP of a given state can be represented by:

$$\left(\frac{y_{it}}{y_{it-1}}\right) = K_{it}^{\alpha} H_{it}^{\beta} F_{ijt}^{\delta} IND_{it}{}^{\tau} (A_t L)^{1-\alpha-\beta-\delta} y_{it-1}{}^{-\gamma} \quad (2)$$

Where y_{it} is the real GDP per capita in state i at time t; K_{it} denotes the share of state government's capital expenditure to total expenditure; H_{it} is literacy rate; F_{ijt} represents per capita bank credit disbursed by bank type j (j=all banks; public, private and foreign banks) in state i, IND_{it} is the share of industrial sector output to state level GDP.

4. DATA AND MODEL SPECIFICATION

4.1 Empirical Model and Estimation Strategy

In order to empirically estimate the significance of the bank credit on the real per capita GDP growth of the sample Indian state, we use equation (2) as our theoretical model. Applying the natural log and introducing the state specific effect and random error term, our empirical model will take the following log-linear functional form:

$$lny_{it} - lny_{it-1} = \alpha_i + \gamma lny_{it-1} + \beta lnF_{ijt} + +\delta lnK_{it} + \rho lnH_{it} + \tau lnIND_{it} + \mu_i + \varepsilon_{it} \quad (3)$$

While all the other variables are as defined before, the constant term (α_i) represents $ln(A_t L)^{1-\alpha-\beta-\delta}$; μ represents unobserved state specific effect; and ε is a random error term.

Among the variables, bank credit is expected to generate growth in per capita income as it relieves financial constraints, promotes investment and facilitates fuller utilization of resources. In our study, we have considered credit data based on utilisation than sanction as capital is freely mobile and credit could originate from the deposits in other regions. Following Önder and Özyildirim (2010) we have considered per capita bank credit (public, private and foreign banks) in our study.

Consistent with the endogenous growth model, human capital stock increases per capita income by facilitating creation of new productive ideas, innovation and technology adoption and improving allocative efficiency. Most studies consider average years of schooling as an appropriate indicator of human capital. Data on average years of schooling is, however, only available at the national level. For our purpose, following the previous empirical studies, we use literacy rate as a proxy to represent human capital (Kendall 2009). Literacy rates in India ranged from 47 in Bihar to 90.68 in Kerala in the 2001 census, which narrowed to 63.82 to 93.9 respectively in Census 2011.

The ratio of government capital expenditure to total expenditure is included assuming that higher state government capital expenditure boosts real income growth, among others, by crowding-in private investment, preventing the diminishing returns of private capital, increasing the overall total factor productivity of the region, reducing transaction cost, increasing aggregate demand and facilitating full capacity utilization (Aschauer 1989, Onder and Ozyildirum, 2012). The share of industrial output in state GDP is considered as higher share of manufacturing is associated with dynamism, structural change and capital accumulation, which are important determinants of growth. It also fosters embodied and disembodied technological change and increases real per capita income.

In estimating the above model, there are a number of econometric problems that need to be addressed. Among others, the coefficient estimates may suffer from endogeneity and simultaneity bias. There are two potential sources of endogeneity in our model i.e., the correlation between explanatory variables and state specific effects; and correlation between explanatory variables and the residual/idiosyncratic error term. The endogeneity bias arises if bank credit and other explanatory variables are correlated with unobserved state specific effects (μ_i). The simultaneity bias arises if the explanatory variables are correlated with the random error term, such as improvement in economic condition triggers expansion in both credit demand and supply or states with best economic prospects might have the most financially developed banking system.

Although the fixed effect model could address the endogeneity problem, it comes with a cost. This estimator entails loss of information and is based on a very stringent exogeneity assumption, namely the explanatory variables are independent or uncorrelated with the initial condition of the state (Y_{it-1}) (Wintoki et al. 2012). But this rarely holds and level of bank credit, capital expenditure, human capital stock and the share of industrial output could be related to the initial condition of the state. Under such situations, since these variables are correlated with the idiosyncratic error term, the fixed effect estimator would generate biased estimates and error terms could be serially correlated. Although simultaneous equation approach can be used to deal with the simultaneity problem, there must be at least one strictly exogenous variable in each equation. Getting exogenous instruments however is usually difficult. To address these problems, we apply dynamic GMM panel estimator.

We use the GMM estimator introduced by Holtz-Eakin, Newey, and Rosen (1988) and Arellano and Bond (1991), and further developed by Arellano and Bover (1995) and Blundell and Bond (1998). This estimator exploits the dynamic relationship inherent in the explanatory variables and uses variables as instruments, and eliminates the need for exogenous instruments. To control for simultaneity, the estimator uses some combination of past values of the variables as valid instruments (Wintoki et al. 2012). Although there are two types of GMM estimators, traditionally known as difference and system GMM, due to its additional advantages, we use system GMM estimator (Arellano and Bover, 1995; Blundell and Bond, 1998). This estimator includes equation in levels and hence, avoids some drawbacks of difference estimator (Wintoki et al. 2012). Accordingly, we estimate the following ‘‘system’’ GMM estimator:

$$\begin{bmatrix} lny_{it} \\ \Delta lny_{it} \end{bmatrix} = \alpha_0 + \gamma \begin{bmatrix} lny_{it-1} \\ \Delta lny_{it-1} \end{bmatrix} + \beta \begin{bmatrix} lnF_{ijt} \\ \Delta lnF_{ijt} \end{bmatrix} + \delta \begin{bmatrix} lnK_{it} \\ \Delta lnK_{it} \end{bmatrix} + \rho \begin{bmatrix} lnH_{it} \\ \Delta lnH_{it} \end{bmatrix} + \tau \begin{bmatrix} lnIND_{it} \\ \Delta lnIND_{it} \end{bmatrix} + \mu_i + \varepsilon_{it} \quad (4)$$

Estimating the level and first difference equations simultaneously will generate efficient estimates while controlling for time-invariant unobserved heterogeneity, simultaneity, and the dynamic relationship between current and past values of the dependent variable. Equation (4) is estimated together with orthogonality conditions, including no correlations between lagged variables and current period error term; zero correlation between lagged first differences of the regressors and unobserved state specific effects, and no serial correlation in the error terms[4].

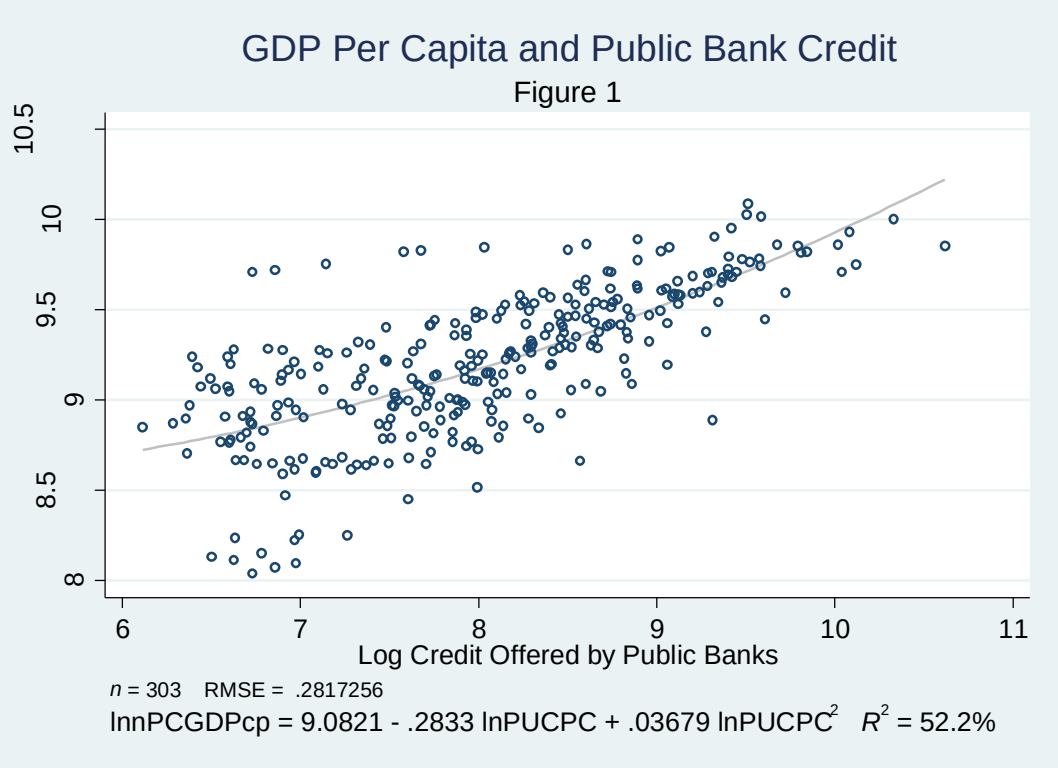
4.2 Data

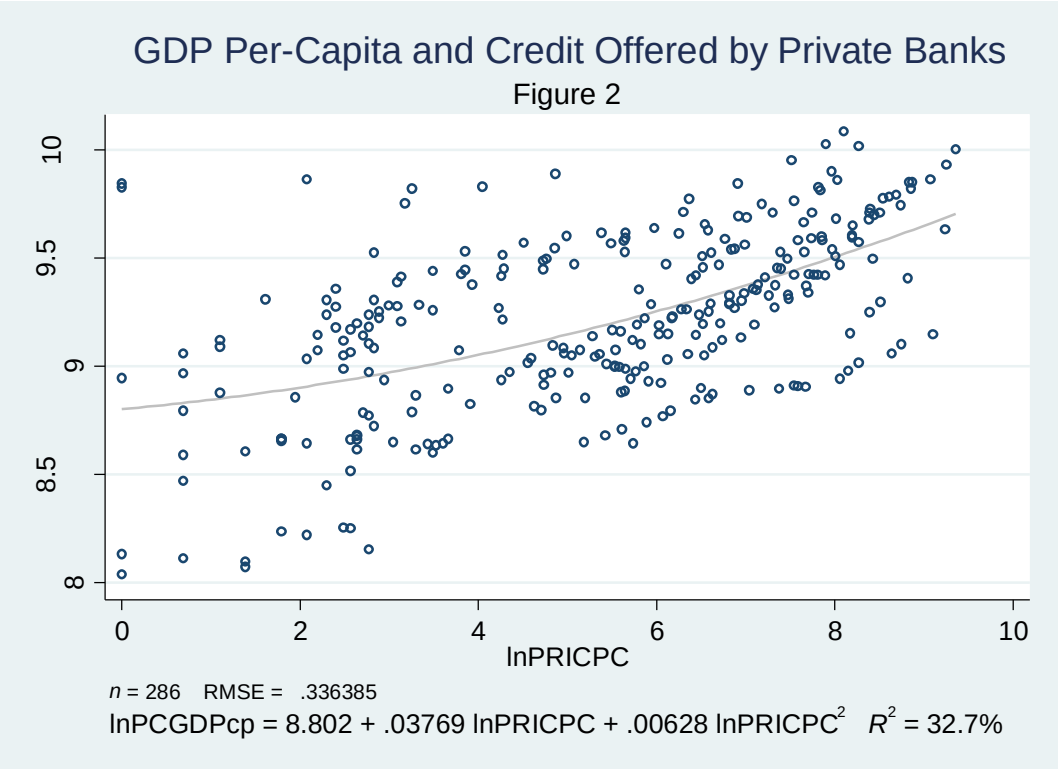
Data frequency is annual, but unbalanced and drawn from 25 Indian states covering years 1996/97-2008/09. Data on real GDP per capita, capital expenditure and bank credit is from RBI publications. Data on literacy rate and industrial output is from Central Statistical Organisation. For analytical purposes, we group states into leading and lagging based on the national average per capita income. Leading states have per capita incomes above national average, while those below are lagging (Appendix 1). A similar such grouping (for instance, developed /developing, high income /low income) exists in almost all the studies at the sub-national level in India. Most of the studies rather focus on major states of India excluding northern hilly states and north-eastern states (Sachs, Bajpai & Ramiah 2001; Ahluwalia 2002; Purfield 2006; Topalova 2008). In our study, we consider 25 states covering more than 95% of the country's population and 97.7% of country's geographical area. Table 1 sets out the descriptive statistics. It shows that public sector banks account for major share of credit per capita in contrast to private and foreign banks.

The regional mean values of the variables show substantial differences between leading and lagging states in almost all variables. For instance, real GDP per capita of lagging states is almost half of leading states. Distribution of bank credit per capita showed large inter-regional variations. Lately, growth in real GDP has picked up in the lagging states.

[4] The lagged per-capita income captures state's initial condition and as the level instead of the difference of the variable is used, the sign of its coefficient is expected to be positive.

As the following quadratic plots show, there is generally a positive association between per-capita income and the credit offered by both bank types.





However, the association between per-capita GDP and credit is stronger for credit offered by public banks than private banks, which can be judged by looking the R^2 , slope of the quadratic curve and compactness (standard deviation) of the data.

In order to see whether this relationship still holds when we control all predictors simultaneously, based on generalised additive models methodology, we also run a locally weighted regression of per-capita GDP on the variables included in the empirical model. As can be seen from the plot, even after controling other predictors, there is a strong association between credit offered by public banks. Although positive, the significance of the association between GDP per-capita and private credit is relatively weaker. The association between human capital and GDP per-capita is more strong compared to capital expenditure and industrial output from GDP.

Locally Weighted Regression of GDP Per-Capita on the Predictors

Figure 3

5. RESULTS

We begin our empirical analysis by testing time series properties of the data, and the result showed that the variables have unit root in levels but stationary in first difference. The cointegration test also showed that the variables are cointegrated.[5] We also tested for the presence of autocorrelation and heteroscedasticity. For autocorrelation, we followed the test proposed by Wooldridge (2002) and further discussed by Drukker (2003). The reported F statistics of the test is 3.2, suggesting that the null hypothesis of no first order autocorrelation cannot be rejected at 9%. Similarly, to test for panel level heteroscedasticity, we followed the groupwise heteroscedasticity test suggested by Greene (2000). The test is conducted on the residuals of a fixed effect regression model and null hypothesis of homoscedasticity is rejected at less than 1%. In order to address the effect of heteroscedasticity and autocorrelation on the results, we used robust estimator.

The Arellano-Bond suggested test for autocorrelation AR(2) yields a p-value ranging from 0.07 to 0.13, which means for almost all cases, we cannot reject the null hypothesis of no

[5] The test results can be provided upon request.

second-order autocorrelation of the error terms. The p-values of the Hansen test of overidentifying restrictions also suggests that the null hypothesis cannot be rejected, implying the instruments are valid. As discussed earlier, one key assumption in order to estimate the system GMM was that the endogenous and other control variables could be correlated with the unobserved effects, but this correlation is constant over time. This assumption is also tested using the difference-in-Hansen test of exogeneity (Wintoki et al. 2012). The p-values of the tests for all models suggest that null hypothesis is valid, namely the instruments used in level regressions are indeed exogenous.[6]

Now we discuss the result of the dynamic GMM estimates, namely equation (5). We estimated the model by considering all samples as well as partitioning the sample into leading and lagging states. In addition, in order to see if the level of impact differs by types of bank, we estimated separate models by disaggregating the credit offered by private, public and foreign banks. The empirical results are reported under Table 2 to 6.

We first discuss the model results estimated by aggregating the credit offered by all the banks (Table 2). The finance variable is positive and significant both when the data of all the states is pooled as well as when the data is disaggregated on the basis of the level of development of the states. For the pooled data model, the result suggests that a 1% increase in credit offered by banks will generate a 0.02% increase in real per capita income. This finding is in line with the overall finance-growth literature indicating positive relationship between financial sector and economic growth.

When the states are disaggregated into lagging and leading regions, although the impact of credit on growth is positive and significant in both groups, its impact is higher in the lagging regions. Possibly for lagging regions the only source of relatively easily accessible credit is bank credit, in contrast to the leading regions which could also borrow from stock market or from abroad (Onder and Ozyildirum, 2012). Also catch up effect could be taking place in the lagging regions which are generally deprived of capital.

In order to compare the relative impact of credit offered by public, private and foreign banks on per capita income, we also estimated the model by types of bank. The results are reported

[6] The test result can be provided on request.

in Tables 3-6. Our findings corroborate the claim that public banks enhance growth of lagging regions by nullifying the financial market failures. This finding is contrary to the finding of La Porta et al. (2002) that government ownership of banks hinders economic growth and is more in alignment with Andrianova et al. (2009) and Burgess and Pande (2005).[7]

From the results, it appears that the impact of credit offered by public banks is generally higher compared to private and foreign banks. The impact of public banks on real per capita income is significant in all cases and its impact is equal in both leading and lagging regions, despite the fact that the average amount of per capita credit offered in lagging regions is lower by 11%. It indicates higher productivity of bank finance and also implies that credit is undersupplied in lagging regions. The positive impact is in line with other recent studies in this area. Coleman and Feler (2015) examined whether during the times of financial crisis and instability government ownership of banks matters, and do these banks lend more and contribute to increased employment and incomes. They investigated this in the context of 2601 localities in Brazil and considered four federally owned banks and 115 private banks having over 18,000 bank branches. Their findings suggest that areas with higher presence of state owned banks experienced increases in credit, GDP, employment and higher per capita incomes. It could also be that public banks may be providing credit (based on the development view) to socially valued projects which may not attract private banks. Tiwary and Thampy (2015) also found higher impact of public banks in rural areas and low income districts supporting the development view of state owned banks. An argument here could be that the presence of these banks due to government mandate could be more in the low income lagging regions. Yet, the data shows that population per bank branch is much higher in the less developed lagging states. Also despite the recent drive on financial inclusion, data 1997-2015 shows highest average decline in population covered per bank branch in the developed leading states.

Credit offered by private banks has a positive and significant impact on the growth of per-capita income when the model is estimated based on the whole sample, but its impact

[7] Although public banks have been more risk bearing, they too can display risk averseness as Banerjee, Shawn and Duflo (2003) and Gupta, Kochhar and Panth (2011) argued that public banks may prefer to park funds in the government securities due to various reasons such as fear of corruption charges, as default may occur on loans and moral suasion and also due to what is called lazy banking.

becomes insignificant when the model is estimated by splitting the sample into leading and lagging states. Private banks display risk averseness as noted by Bhaumik and Piess (2006). The authors conjecture that risk behaviour of banks is negatively influenced by the quality of borrowers and ability of banks to diversify borrowers. Also, low geographical coverage of branch network of private banks and lack of information on the borrowers especially in the lagging regions may constrain them from extending credit. The risk aversion of the banks also may be due to presence of non-performing assets and is reflected in their large investments in government securities, more than what is statutorily required (Bhaumik and Piess 2006). Also the private banks in the presence of volatility could withdraw from lending (Coleman and Feler 2015).

When the model is estimated using the whole sample, credit offered by foreign banks has no significant impact on per capita income growth. However, if estimated by disaggregating the states according to their level of development, credit offered by foreign banks is significant in leading regions, but not in lagging states. The presence of foreign banks is negligible in all the regions barring relatively developed western and southern regions. In a study on the entry of foreign banks in India during the nineties, Gormley (2007) established that foreign banks financed only a small number of firms. Further, they use locational advantages by 'cherry picking' and locate in already developed and fast-growing regions, and regions or locations less developed are overlooked. Overall, heterogeneity in different impacts of different bank groups could be due to several other factors such as state specific characteristics, its specific endowments – institutions, infrastructure, quality of projects, magnitude of credit, innovative projects which to lead to spurt in growth or existing working capital to firms.

When the impact of other control variables is considered, the rate of growth in per-capita income level is strongly related to initial per-capita income, stock of human and physical capital and share of the industrial sector output. The magnitude and the sign of the coefficient of the lagged income per capita is negative and less than one. It suggests a degree of convergence among the states and it is consistent with the findings of previous studies.[8]

[8] The empirical finding on whether there is convergence or divergence is however mixed. A number of studies have shown absolute divergence in per capita income in Indian states (Marjit and Mitra (1996), Ghosh et al. (1998), Raman (1997), Dasgupta at al. (2000), Rao et al. (1999), Aiyer (2001), Ahluwalia (2000); Kumar and Subramaniam 2012. Some have shown convergence. More recent literature for instance, Rowan (2015) and Cherodian and Thirlwall (2016) show divergence and weak convergence. Increased inequality across the states, low investment levels, high share of agriculture and lack of good institutions could be some of the reasons for divergence among the states.

In leading regions, productivity of physical capital is significant, but not in lagging regions. This holds in all cases. The variable that represents the share of industrial output is significant in lagging regions, but not in leading regions. The level of human capital stock has a significant impact on the growth in per capita income in leading states. In the lagging states, the variable is not significant when public banks credit is introduced as the explanatory variable of the model. However, it is significant when all banks are considered together and when disaggregated into private and foreign banks, perhaps implying that human capital is important in lagging states and can have positive impact on growth despite the insignificant impact of bank credit. In consistence with other studies, the results also show that public capital expenditure is positive and significant especially for leading states in all regressions (Misra, 2012; Bose and Bhanumurthy, 2013). This result is also consistent with the findings of other studies. For instance, RBI (2016) reported that public capital expenditure generates more growth than revenue expenditure. Using the data for the period 2001-02 to 2013-14, the results showed that capital expenditure impacts per capita GDP growth positively, in contrast increase in non-development expenditure has a negative impact on growth. Further, shifting public expenditure in favour of capital expenditure in the presence of fiscal deficit results in positive contribution to economic growth.

5.1 Robustness Checks

The key assumptions on which the estimation of the model rests are: the instruments are relevant and appropriate and there are no autocorrelation in the idiosyncratic errors. For the latter, we follow the test suggested by Arellano and Bond (1991) and test for the absence of correlation between second-differenced idiosyncratic errors. This test is mainly concerned with whether or not we have included enough lags so that there are no autocorrelations of error terms. If the autocorrelation is removed any historical value of the variables beyond those lags are potentially valid instruments. For the validity of the instruments or to test whether the instruments are exogenous, we follow the Sargan and Hansen test of over-identifying restrictions. As indicated above, although the system GMM addresses some shortcomings of the difference GMM, it assumes that unobserved heterogeneity is time invariant. In contrast to the difference GMM, this estimator includes level equation based on this assumption and therefore robustness of the result depends on its validity. In most cases, this estimator is used by making an additional assumption that the correlation between

unobserved state specific effects and the endogenous variables is fixed or constant over time. The validity of this assumption will be tested using a difference-in-Hansen test of exogeneity (Wintoki et al. 2012).

As a robustness check, although not reported here, using the Arellano and Bover (1995) we estimated all models using a "forward" orthogonal deviation transformation. In this case, we used average future observations of the variable as instrument rather than the first difference or lag values of the variable as instruments. This allows us to avoid the assumption that there is constant correlation between the endogenous variables and state specific effect. We also estimated a difference GMM as an additional robustness check. The conclusion remained the same, but the coefficient of the finance variable in the pooled data model is 0.06 and significant at 1% and public bank credit variable has a coefficient estimate of 0.07, which is significant at less than 1%. The coefficient estimates for credit offered by private and foreign banks are insignificant. Although the presence of a lagged dependent variable bias the result, when a within fixed effect model is estimated, the results are qualitatively similar to those reported here. In general, irrespective of estimation method, bank credit increases per capita income, but the impact of credit offered by public banks is stronger in all cases.

In order to check whether productivity of public credit differs by degree of development, we also estimated a pooled model, namely by pooling the data of lagging and leading states. In the model we introduced a dummy variable that categorizes samples into lagging and leading. A value of 1 is given for the leading and 0 for the lagging states. We also introduced another variable by interacting this dummy with the credit offered by public banks. The finance variable is still positive and highly significant with a coefficient value of 0.038. However, the dummy variable, although positive, is not significant. The interaction term, however, is negative but still insignificant. It means, although productivity of credit offered by public banks is higher in lagging regions, the difference in productivity between lagging and leading states is not significant (the result can be provided on request). Therefore, it is difficult to establish whether the credit offered by public banks is more productive in lagging states.

6. CONCLUSION

Government intervention in banking sector is expected to overcome some of the barriers due to lack of information and increased risks and assist economic growth of less developed

regions, thus reducing regional disparities. In this study, we examined whether public sector banks, are contributing to economic growth of the less developed states in India.

The empirical results consistently suggest that the level of financial development is a key determinant of regional income growth as well as a determinant of the speed and degree of convergence in per capita income across spatial locations. Our analysis also looked at disaggregated credit offered by private, public and foreign banks. The result generally suggests that the credit offered by public banks generates higher growth. Although credit offered by private banks generates income growth in developed regions, its impact on lagging regions is insignificant. The results generally support the claim that state interventions in the form of public banks could counteract the adverse effect of market failure in financial markets and promote growth and regional equity. However, the differential relative impact of public banks in lagging regions is insensitive to aggregation. Accordingly, although the result showed that public banks generate more growth in general, it is not possible to clearly establish whether the growth impact of public banks is higher in lagging regions.

Considering positive and significant contributions of bank credit to per capita income growth of the lagging states, and also the role of the industry, some of the policy implications emerging from our research are that promoting industrialization in lagging regions may speedup regional convergence. This will assist in reducing regional disparities, pushing economic growth and improving credit absorption capacity of the less developed states. This policy implication is applicable in other developing countries as well where financial sector can be channelized as a tool to promote industrial sector for achieving strong regional growth.

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Table 1: Descriptive Statistics of financial and economic indicators (1996-2008)

	All States				Leading	Lagging
Variables	**Mean**	**Standard Deviation**	**Minimum**	**Maximum**	**Mean**	**Mean**
Real GDP (Rs bln)	547.5	648.3	8.6	4339.4	794.3	374.1
Real GDP Per capita (Rs)	10641	4190	3100	24010	13921	8578
Growth in Real GDP	16.0	9.0	-8.3	30.2	12.8	12.0
Growth in Real GDP per capita	5.5	2.5	0.6	9.0	5.0	3.9
Bank credit/GDP	383	24.4	5.7	145.4	52.0	28.2
Bank credit per capita	6931	8711	505	71702	11771	3543
Public sector bank credit/GDP	30.7	16.7	5.7	101.6	39.9	30.7
Public sector bank credit per capita	5421	6720.4	452	51870	8941	2958
Private sector bank credit/GDP	6.8	10.8	0.0	67.2	10.8	4.0
Private sector bank credit per capita	1291	2260.4	0	14534	578	2340
Foreign bank/credit/GDP	1.5	3.1	0.0	15.3	3.2	0.3
Foreign banks credit per capita	410	893	0	5774	767	66

Source: Computed by authors.

Table 2 : Bank Credit and State level Income Growth

Variables	ALL	LEADING	LAGGING
Lnyt-1	-0.06**	-0.04	-0.07**
	(-2.91)	(-1.27)	(-2.71)
*l*rH	0.12*	0.10*	0.16*
	(2.39)	(2.21)	(2.11)
l*n*F	0.02***	0.02**	0.02*
	(3.92)	(3.52)	(2.23)
*ln*K	0.19***	0.22***	0.15
	(3.91)	(4.63)	(1.57)
IND	0.11**	0.06	0.10*
	(3.10)	(0.87)	(1.99)
_cons	0.23	0.14	0.36
	(1.77)	(0.55)	(1.88)

N	216	110	106
sargan	156.95	124.21	73.85
sarganp	0.93	0.05	0.97
hansen	18.16	6.83	8.61
hansenp	1	1	1
ar2	1.51	-0.5	1.5
ar2p	0.13	0.61	0.13

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Source: Own Calculation based on the Survey Data

Table 3: Public Bank Credit and State level Per capita Income Growth

Variables	ALL	LEADING	LAGGING
Lnyt-1	-0.04*	-0.06	-0.05**
	(-2.57)	(-1.57)	(55.48)
*l*rH	0.08	0.09*	0.14
	(1.46)	(2.02)	(1.90)
l*n*F	0.02***	0.02***	0.02*
	(3.92)	(3.53)	(2.23)
*ln*K	0.16***	0.21***	0.11
	(3.51)	(3.86)	(1.5)
IND	0.05	0.03	0.06
	(1.41)	(0.54)	(1.31)
_cons	0.14	0.27	0.22
	(1.55)	(0.97)	(1.89)
N	276	118	158
sargan	169.41	111.41	112.72
sarganp	0.98	0.34	0.96
hansen	21.08	4.58	11.61
hansenp	1	1	1
ar2	1.72	-1.29	1.77
ar2p	0.09	0.2	0.08

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Source: Own Calculation based on the Survey Data

Table 4 : Private Banks' Credit and State level Income Growth

Variables	ALL	LEADING	LAGGING
Lnyt-1	-0.03	-0.00	-0.06
	(-1.63)	(-0.18)	(-1.95)
*l*rH	0.12*	0.13**	0.25**
	(2.56)	(3.14)	(2.7)
l*n*F	0.004*	0.003	0.004
	(2.19)	(1.40)	(1.83)
*ln*K	0.16***	0.22***	0.08
	(3.66)	(4.85)	(1.19)
IND	0.11**	0.01	0.12***
	(3.16)	(0.16)	(4.29)
_cons	0.13	-0.07	0.39
	(1.12)	(-0.37)	(1.76)
N	262	118	144
sargan	172.78	111.9	103.03
sarganp	0.96	0.33	0.97
hansen	20.4	3.99	10.36
hansenp	1	1	1
ar2	1.62	-1.14	1.65
ar2p	0.1	0.25	0.1

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Source: Own Calculation based on the Survey Data

Table 5: Foreign Bank Credit and State level Income Growth

Variables	ALL	LEADING	LAGGING
Lnyt-1	-0.03	-.0.01	-0.04
	(-1.77)	(-0.46)	(-1.96)
*l*rH	0.19***	0.16**	0.23***
	(4.10)	(3.10)	(3.42)
l*n*F	0.003	0.005*	0.002
	(1.76)	(2.34)	(0.93)
*ln*K	0.23***	0.24***	0.18
	(4.31)	(5.48)	(1.86)
IND	0.08	0.01	0.12**
	(1.73)	(0.08)	(2.61)
_cons	0.11	-0.06	0.23
	(0.91)	(-0.31)	(1.32)
N	210	110	100
sargan	156.04	127.44	65.66
sarganp	0.89	0.03	0.98

hansen	19.66	6.78	6.27
hansenp	1	1	1
ar2	1.48	-0.92	1.5
ar2p	0.14	0.36	0.13

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Source: Own Calculation based on the Survey Data

Table 6: Bank Credit and State Level Income Growth (Pooled data)

Variables	PUBLIC BANKS	ALL
Lnyt-1	-0.04*	-0.06*
	(-2.57)	(-2.51)
*l*rH	0.09	0.12*
	(1.66)	(2.53)
Interaction1	-0.001	
	(-0.15)	
dum_la_le	0.02	-0.03
	(0.24)	(-0.54)
l*n*F	0.02**	
	(2.77)	
*ln*K	0.17***	0.20***
	(3.63)	(3.92)
IND	0.05	0.11**
	(1.32)	(3.04)
Interaction2		0.001
		(0.63)
lnallbankpcc		0.02**
		(2.84)
_cons	0.19	0.28
	(1.78)	(1.68)
N	276	216
sargan	170.02	157.1
sarganp	0.97	0.91
hansen	20.56	17.74
hansenp	1	1
ar2	1.72	1.51
ar2p	0.08	0.13

t statistics in parentheses.
* p<0.05, ** p<0.01, *** p<0.001
Interaction1=Public credit*region dummy, where 1 is for leading and 0 for lagging.
Interaction2=Bank credit by all banks*region dummy, where 1 is for leading and 0 for lagging.

Appendix 1

Table 1: Classification of states based on per capita income

Leading States	Lagging States
Gujarat	Assam
Haryana	Bihar
Himachal Pradesh	Jharkhand
Karnataka	Madhya Pradesh
Kerala	Chattisgarh
Maharashtra	Orissa
Punjab	Rajasthan
Tamilnadu	Uttar Pradesh
Andhra Pradesh	West Bengal
Arunachal Pradesh	Manipur
	Meghalaya
	Mizoram
	Nagaland
	Tripura
	Jammu & Kashmir